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DEPARTMENT OF MEDICINE

ADDRESS

Delivered Oct. 1st, 1890, at the Opening of the Session

BY

SIR SPENCER WELLS, BART., F.R.C.S.

SURGEON TO THE QUEEN'S HOUSEHOLD

(Published by order of the Council.)

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The Owens College

DEPARTMENT OF MEDICINE

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SIR SPENCER WELLS, BART., F.R.C.S.

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MANCHESTER: J. E. CORNISH

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ADDRESS.

Mr. President and Gentlemen:

Thirteen years ago in this College I addressed a large assembly of medical practitioners, not members of any one college or university, but coming from many parts of the United Kingdom, from our Indian Empire and our Colonies—physicians, surgeons, general practitioners, and specialists, all united in one brotherhood, the British Medical Association. I then spoke of the progress of surgery since the foundation of the Association forty-five years before and during the Victorian age. At that time, nearly sixty years ago, but still in the recollection of some few who hear me, lithotrity was a novelty. So was the subcutaneous division of tendons. The radical cure of hernia was derided. Charles Clay's earliest cases of ovariotomy were still unheard of. The day of anæsthesia had not dawned. No one had practised the subcutaneous injection of narcotics. The cure of ruptured perineum and vaginal fistulæ were rare surgical curiosities. The mortality after capital operations, in hospital and in private practice, was excessive. Deaths from pyæmia or surgical fever in those septic days were frightfully numerous. Even when I spoke, the elastic ligature, forci-pressure, and bloodless surgery had scarcely begun to influence general practice. Yet I cannot think I was wrong in attempting to prove that, however great may have been the progress of the nation, however great the advance in any science or art between

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the Elizabethan and the Victorian age, the advance in medical science generally, and especially in surgery, had been fully as great.

To-day I have the pleasure of addressing not only brother practitioners, some of my own age and experience, very many other much younger toilers of the day, not only practitioners but teachers who have achieved success and renown, and some who have not joined our ranks, but are aspiring students not yet very far advanced in their preliminary work. I assure you that I value very highly the privilege of being allowed to address some hundreds of educated minds, but my task is far wider than it was in 1877. Then I was restricted to one branch of our science and art: and I could not do more than endeavour to point out how every one of us, individually and collectively, might assist in the advancement of the surgery of the future. Thirteen years then in the future have since been numbered with the past, and the hope of continuous progress has been fully justified. The experimental researches of Ferrier have been followed by the practical application of his teaching by Horsley and Macewen, and what is called "brain surgery" is in process of rapid development. Abdominal surgery generally has been widely extended by following the path opened by ovariotomy; and while a passing tendency to advocate and perform unnecessary mutilating operations deserves severe condemnation, the work done has been in the main useful and meritorious. The horizon is still becoming wider and wider, and a word of caution is not quite unnecessary against anything likely to lower the standard of surgical morality or the character of British surgeons.

And now I can speak of medicine as a whole—one science, one art—and have the great pleasure of opening this Session of the medical department of Owens College in the Victoria University. As each of the professors and lecturers will open his own class, I am freed from anything which is not of general importance to us all, and am enabled to confine my remarks within reasonable limits, and to ask your indulgence for what I know must be a very imperfect attempt to show in a few minutes what sanitary administration and recent advances in medical science and practice (curative and preventive) have done for the English nation; not only by lowering the death-rate and thus increasing the number of the population, but by raising the standard of the people, replacing a feeble and sickly race by one strong and healthy, and so improving the weak and incompetent that they may become healthy, vigorous, useful workers for the commonwealth, not part of a nation of invalids.

If we attempt to estimate the importance of medical science as a State influence, contributing to the health and happiness of the people, we must turn for proof to the dry facts and figures of statistics; and it is only in recent times that this resource of verification has been at the command of inquirers. The Elizabethan parochial registers, family Bibles, and municipal records gave meagre information as to the fluctuations of the population, or the nature, prevalence, and origin of disease. Until the establishment of civil registration in 1837, next to nothing was known of the annual variations of the death-rate in England. The Registrar-General's mortality statistics now embrace a period of fifty-three years, and constitute the only trustworthy source of information as to the changes in the death-rates, their probable causes, the balance of loss or gain to the community therefrom, the increase or decrease of mortality from special causes, the effect of sanitary administration, of geographical position, differences in the age, sex, and distribution of the population, the closeness of its aggregation, and, above all, the character of the occupations in which it is engaged. In the same way, these reports are the only solid bases for calculations as to the probable duration of life in England. It is, however, only since 1845 that the returns can be regarded as correct, and it is only to those of still more recent years that we can look for proofs of the beneficial changes which there was a general conviction were taking place. It is even now too early to perceive the full effect of all the influences tending to lessen the mortality of the country; we must wait some years more before we obtain full evidence in exact returns of what can be accomplished. But for our present requirements we can very well rest content with the results disclosed by those of the last ten or twenty years. Some interesting facts are clearly made out. There is a manifest prolongation of the average duration of human life. The mean death-rate of the population has been strikingly lowered, and the prevalence of infective diseases, with the mortality arising from them, has been sensibly diminished.

Although the death-rate varied from year to year, it may be said to have remained practically stationary during the thirty-three years, 1838–70. If we divide this series of years into what may be called census decades, we find a remarkable equality in the mean death-rate. The rate averaged 22·3 per 1,000 in the three years, 1838–40; 22·4 in the ten years, 1841–50; 22·2 in the

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ten years, 1851–60; and 22·5 in the ten years 1861–70. Early in the last decade for which we have summaries, in 1872, the passing of the Public Health Act, and the further Act of 1875, marked an eventful epoch in the history of sanitary progress in England. The operation of these Acts seemed to have proved a powerful factor in the recent notable decline in the English death-rate; for in the decade 1871–80 the fall reached a point lower than that of any preceding ten years since civil registration began. The decline has since continued; for in the first two years of the current decade the unprecedently low rates of 18·9 and 19·8 were respectively recorded. And if we turn to the report of the thirteen weeks of the second quarter of this year ending July 31st last, we find that the death-rate of twenty-eight of the largest English towns, including London, averaged 19·1 per 1,000, and was 0·8 below the mean rate in the corresponding periods of the ten years, 1888–9. In London the rate of mortality did not exceed 17·3 per 1,000, while it averaged 20·5 in the twenty-seven provincial towns, ranging from 14·5 in Nottingham to 29·8 in Manchester. It is true that this is for only one quarter, and that usually the lowest in the year; but a glance at the table before us shows how remarkably the annual death-rate has diminished in the twenty years between 1870 and 1890.

Death-rate per 1,000.

	1870.	1890.
England and Wales	22·5	17·9
Twenty-eight largest towns	24·4	19·0
London	22·5	17·3

And this other table of the annual mortality in England and Wales in successive periods of ten years during the age of registration shows very remarkably the immediate effect of the passing of the Acts of 1872 and 1875, while it also shows that epidemics, such as cholera and influenza in 1847 and 1849, do not much affect the average of a decade; perhaps taking off chiefly those who would have died of other diseases, and leaving the survivors with a longer expectation of life.

Annual Mortality in England and Wales.

Ten Years.	Mortality per 1,000.
1841–50	22·4
1851–60	22·2
1861–70	22·5
1871–80	21·2
1881–90	17·9

And I must also direct your attention to one more table before I can leave figures and calculations.

Recorded Death-rate in English Towns in Second Quarter of 1890.

Towns.	Mortality per 1,000.
Nottingham	14 to 15
Birkenhead Huddersfield	16 to 17
London	17 to 18
Birmingham Wolverhampton	18 to 19
Bradford Oldham	19 to 20
Blackburn Leeds Preston Salford Liverpool Sunderland Halifax	21 to 22
Sheffield	24 to 25
Newcastle-on-Tyne Bolton	26 to 27
Manchester	29 to 30

This table shows the recorded death-rate in some of the largest towns in England in the second quarter of this year: and I ask you especially to note that, as I have omitted fractions, it is unnecessary to calculate a mean for the other quarters of the year in order to show what a remarkable difference there is in the mortality of these large towns. I have not time to compare the mortality of this second quarter of 1890 with that of previous years or decennial periods. It is enough for my present purpose to ask if anyone can look at that table without wonder? Can it be credible that in the three months ended only last July the mortality of Nottingham should have been less than half that of Manchester? Is it possible that in another large manufacturing town, instead of the Manchester death-rate of nearly 30, that of Birmingham should have been only a little above 18? Why is this? Whose fault is it? Can it be remedied? It is for you, not for me, to answer these questions, and you ought to answer them; if you do not, you neglect your clear duty. It is a matter of life and death to you and your neighbours. There can be no doubt that the present population of Manchester is nearly 400,000. If you could reduce the death-rate to that of Birmingham there would be a saving of 4,000 lives every year, more than a third of the present loss by death. Take the population of Birmingham in round numbers at half a million. If the death-rate there were raised to that of Manchester the deaths every year there would be 3,000 more than they are now. Surely this disparity can be equalised. The death-rate in the country generally and in all large towns must be lowered; and it will be lowered if the municipalities carry out the recommendations of their health officers—lowered not only from the present 29 of Manchester to the 18 of Birmingham, the 17 of London, the 14 of Nottingham, but lower still. It is merely a question of sanitary administration. In London and some of the largest towns, and in some extensive county council districts, no doubt the health officer of the future must devote his whole time to the duties of his office; but in smaller towns, in the suburbs of large cities, and in country parishes, the work will be done by the family doctor, and he must prepare himself for the work. That it may be well done by the general practitioner I can speak from my own knowledge. I do my work in London, but I have lived for more than thirty years past with my family at Hampstead, a suburb only four miles from Charing Cross; the four-mile radius bisects the parish. The medical officer of health is Dr. Gwynn, one of the busiest of the family doctors in the neighbourhood, but he still finds time to direct the inspectors and the sanitary staff, and to keep the vestry well informed on all matters affecting the health of the district. I have just seen his annual report for the registration year 1890, and he shows that while the death-rate for England and Wales for 1889 was 17·85 per 1,000 and for London 17·45, that for Hampstead was only 10·5. I was called a sanitary enthusiast a few years ago when I said that the death-rate of London might be reduced to 12 per 1,000, yet we see now that in one of its suburbs it actually has been reduced below 11. Consider for a moment how many thousands of lives would be saved every year if this rate could be maintained over the whole country.

I need not tell such an audience as this that the excessive mortality of Manchester, and its increasing rate of late years, has greatly occupied the attention of the medical profession, especially as the mortality of other towns which formerly equalled or exceeded that of Manchester has been considerably reduced. Nor need I add that the mortality in different districts of Manchester varies considerably. Dr. Ransome, as Chairman of the Sanitary Association, has repeatedly directed attention to the facts, and they have been the subject of several conferences. Dr. Thresh has ascertained that in the sanitary district No. 1 (Ancoats), "the true death-rate of the whole district is seen to be over 50 per 1,000, whilst in the courts it exceeds 80, and in one street has actually exceeded 90." There must be some powerful influences at work to produce such appalling mortality. The housing of the people, their overcrowding in back-to-back tenements, and in courts and alleys so close and dirty that they are described as disgraceful to the city in general, and especially to its Council—the pollution of the air and the soil from cesspits, dry ashpits, and graveyards; the smoke nuisance; the want of sufficient wholesome food; habits of intemperance, and a want of proper care of infants—are all remediable causes of avoidable sickness and premature death. Anyone who will read Dr. Thresh's inquiry, published by the Manchester and Salford Sanitary Association, and his account of the condition of the house property in the district; its subsoil, drains, and sewers; its water supply, over-crowding, filth, and want of ventilation, will cease to wonder at the high death-rate and be surprised that it is not far higher.

Dr. Fred. Scott read last year to the Manchester Statistical Society the following extract from the report, dated 1887, of your former able medical officer of health, Mr.

Leigh, who, speaking of St. George's and Ancoats districts, said: "The houses are amongst the oldest in the city, the walls saturated with animal exhalation and reeking with polluted atmosphere. . . . Most of the streets in which these cottages lie are narrow—little more than alleys—with few crossings, and utterly deficient in ventilation. . . Let anyone accustomed to a better condition of life put his head into one of them, and he will be met with a mephitic atmosphere the like of which is not to be found in the domicile of any other animal. Stables and shippons, and even pigstyes have their peculiar smells, but they are not poisonous, or repulsive, or offensive as these. No animal could live in them and flourish. To describe their nauseous character, I have sometimes said, in a bantering spirit, 'Put a pig into one of them, and feed him on the best for a twelvemonth, and he will come out a lean pig.' And yet industrious men and women and little children live in these, and their weak frames and pallid faces tell of their surroundings!"

Observe this picture is painted by one of yourselves. It is just possible that well-fed, well-housed, well-dressed, well-educated, benevolent members of the Council may imagine that such a deplorable condition of the city they govern is no fault of theirs; that they cannot prevent the death every year, from remediable causes, of 3,000 to 4,000 of the people committed to their charge. It is not for me to address such councillors, but I do hope that they will read, mark, learn, and inwardly digest what a graduate of the Victoria University—one of their own citizens, Dr. Thresh—published last year about Ancoats.

"The present system, or want of system, is a disgrace to any civilised community. Above all things, the sanitary inspection of the densely populated district should be much more efficient, the staff of inspectors being increased if necessary. In all our investigations in the Ancoats districts, though we have frequently met the inspectors in the leading thoroughfares, and have seen them evince a good deal of curiosity as to our movements, we have never on any occasion had the pleasure of meeting one in any of the filthy passages or courts. The instructions issued for the guidance of inspectors, and published in the Medical Officer of Health's Report for 1870, are admirable, and if acted upon would soon effect a change in many of the districts; but what is the use of saying that an inspector shall see that the doors of the ashpits are kept locked and in good repair, when in some large blocks 90 per cent of the ashpits are allowed to be without doors altogether? And of what avail is their inspecting 'all courts and passages,' and reporting 'all such as are in bad condition, or in which are collections of fluid or solid matter,' if the Corporation has not the power or will not exert it to cause these nuisances to be removed? To read these instructions, and then to visit No. 1 District (Ancoats) almost drives one to the conclusion that the whole system of inspection, so far at least as that district is concerned, is intended to be a farce; and so it would be were not the results so tragical."

I am glad to hear from a friend that your City Council are at last "beginning to do something." Let us hope it may be done in real earnest, if not for the sake of the poor working people, in the interest of the councillors themselves. Do they suppose for a moment that they could cultivate a crop of dandelions, thistles, and stinging nettles in Ancoats, and that their own gardens and fields in the suburbs would not suffer from the seeds carried to them by the winds? And will they not understand that neither they nor their children do or can escape the seeds of the infective diseases now so fatal which would disappear if the details of a perfect system of sanitary administration were duly and properly enforced?

If it be asked why the mortality of Nottingham and Birmingham has been reduced so much in the last twenty years, while that of Manchester remains so high, I can only repeat that the sanitary laws neglected here have been obeyed there. In Nottingham the disposal of fæcal refuse has been completely altered since 1868. It has been utilised as manure, and the other refuse has been burned at a distance from the town. The water supply, which before 1884 was derived from the Trent and from wells beneath the town, has since been taken from the sandstone outside the town, away from all probable sources of pollution. It is pure and soft, abundant, and delivered on the constant system without storage cisterns. When will Londoners be equally favoured? The successive improvements in drainage and sewerage, the impermeable paving of roadways, narrow streets, courts, and alleys, and the opening up of the denser parts of the town by wide thoroughfares, with the removal of the isolation hospital to a site far removed from all dwelling houses, are all important changes which have been completed within the last twenty years, and there can be no reasonable doubt that the improved health and the longer life of the inhabitants have been largely due to these sanitary reforms and the careful manner in which they have been enforced. In Birmingham even greater improvements have been made in the dwellings of the poor, and the good effect of the isolation hospital in checking the spread of scarlet fever has been remarkable. In both towns the decline in the death-rate since 1860 has coincided with successive sanitary improvements—from 27 in the thousand to 24, 20, 18, and 16—while the infantile mortality and the deaths from phthisis and from zymotic diseases have been still more considerably reduced. I could easily prove this if I had time, and anyone who wishes to satisfy himself of the accuracy of the figures may readily do so by consulting the weekly and quarterly returns of the Registrar-General, or of your own medical officer of health, Dr. Tatham, whose special report on the sanitary administration of the city last July is a very able document, which I earnestly hope the Council will favourably consider.

The decline in the death-rate of the country generally has been shared by both sexes, but unequally, females having the advantage. But the advantage has not been equally shared by persons of all ages. Speaking generally, the rates fell for the earlier age periods, while they rose for the later periods of life. It has been asserted, and it is a point fairly open to discussion, that the changes in the death-rate on which we have been congratulating ourselves have not conferred any benefit upon the community at large. The suggestion is that, as the mortality has only fallen for the earlier age periods, while it has actually risen for the later stages of life, the country has not been upon the whole a gainer, seeing that the lives which it has gained have been lives in the unproductive period of existence, while the lives which it has lost, though fewer in number, have been lives at the most valuable and productive stage. This question has been carefully studied, and, in order to resolve it, a new English life table has been constructed, based upon the mortality in 1871-80. This may be compared with the first life table of Dr. Farr, in preparing which he took as a basis the mortality in 1838-54. Such a comparison enables us to ascertain what amount of lifetime has been added to the community by the diminution in the death-rate since 1838-54, and to what age periods, or stages of life, these additional years belong.

Calculations made upon the figures in this new table give us the following result: The mean lifetime of males is now, according to the new life table, 41·35 years, whereas by the old table it was only 39·91 years. According, therefore, to the new life table, a million males would live 1,439,139 more years than would be the case according to the old table. The expectation of life at birth for females has also augmented by 2·77 years on an average for each female. A million of females would now live 2,777,584 additional years. Two millions of the population would thus live more than four millions of years beyond what would be the case under the old table. Now it appears from an analysis of a table specially drawn out to throw light upon this question, that 66 per cent in the case of males, and 65 per cent in the case of females of these aggregate years saved are lived in what we may fairly take to be the most valuable part of life, that which intervenes between the ages of 25 and 65 years. It is thus made clear how erroneous is the conclusion that because the death-rates have fallen only in the earlier age periods, while they have risen in the later age periods, the life condition of mature people is not improved, that the aggregate gain to the community is

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confined to the unproductive years of life, and that the country is in no way benefited by the change.

Dr. Ogle has put the statistical evidence of the benefits of sanitary measures in a different form. He estimates that the additional years lived and shared among the members of the community—by the mean number of children annually born in England and Wales under the improved changes in the death-rates during the time between the formation of the old and new life tables—amount to nearly two millions. A simple calculation shows that the actual number of years thus gained is equivalent to 43,903 lives, with the higher expectation of 41·35 years, instead of 39·31 as it was in the old life table.

Now, as houses and lands are of value because they yield annual returns, so the income of the population, derived from pay for work done, can be capitalised sufficiently near to the true value to show that the value of the population itself is one of the most important factors in the wealth of the country. I cannot now say more about the money value of human life, but it must not be forgotten that the very highest authority on vital statistics—William Farr—has calculated that "the minimum value of the population of the United Kingdom—men, women, and children—is £159 a head, that is, the value inherent in them as a productive money-earning race." So that, in addition to the increased average duration of life, the increased productive powers of the population, due to the prevention of sickness and its shortened duration, must also be considered when estimating the economic value of sanitary science to the nation. Taking, then, Farr's reckoning of the value inherent in the population of England, we may represent the annual increment accruing to the wealth of the nation from this improvement, in a monetary form, as rather more than six millions and a half. The memorable words of the late Prince Rudolf, when opening the International Hygienic Congress at Vienna, should never be forgotten: "Man is the most precious capital of the State and of society in general. Every individual life represents a certain value." This truth is not yet fully accepted even by men of science, and the general public are perplexed by the most contradictory opinions. Some people prophesy such fearful evils from an increasing birth-rate and a diminishing death-rate that they should logically welcome a bloody war or a devastating pestilence as a blessing, and encourage artifical checks to increase of population as economic morality, or the drowning of all sickly children as religious duty. Men and women, however, are born not only to live and die, as if they were statistical counters, but to enjoy a healthy existence and to make it useful. Sanitary work would fail in its object if it only prolonged life. It has succeeded to a certain extent in rendering manhood more possible. What it has now to do is to preserve the integrity of that manhood, to make its utility durable, and its end natural.

Accepting the two facts of a smaller death-rate in the English population and a prolongation of the average duration of life—and admitting a proportionate gain of health and valuable years to the community—two questions of a practical nature present themselves for consideration: first, how has this result been obtained? and, secondly, by what means can it be improved?

1. It is impossible to determine with any exactness in

what proportion various causes have contributed to this amelioration. Some are persistent, while others have acted intermittently, and counter currents or cross influences have at times interfered with their regular action. The course of events, however, within the last fifty years has uniformly tended to lay bare the truth that no popular delusion is more absurd than that which supposes the people to be the best judges for themselves in matters which regard their health. In no other respect have they acted more like children, or manifested greater presumption, folly, and credulity. Even the vagaries of politicians have been less fruitful of mischief. Left to themselves, with the inertness of masses hindering any initiative impulse, they have shrunk from interference with their fate: and, though free to co-operate for their own preservation, have succumbed to evils of their own creating and within their own means of removal. The intolerable pressure of some notorious abuses, the spread of information, the uprising of a spirit of inquiry, and an outburst of energetic movement on the part of our sanitary pioneers, at last disturbed this fatalistic attitude and brought into play the new influences of teaching and example.

There can be no reasonable doubt that the very marked and progressive decrease in the general death-rate is due to the efforts to improve the sanitary condition of the country. Men such as Southwood, Smith, Chadwick, Farr, Simon, and Richardson, not only revealed the widespread existence of deteriorating evils, but probed and exposed their cause, suggested remedies, and prompted necessary legislation. We are now in too early a stage of the action of the influences which have been brought to bear upon the well-being of the people at large to form a just forecast of what may be expected, but some of the facts presented in Dr. Ogle's comments on the probable causes of the changes in the death-rates in the registration districts of England and Wales during the ten years, 1871-80, throw light upon some perplexing questions, and are worthy of your careful consideration.

In the first place, it must be noted that these recent changes in the death-rates are only continuations of similar changes in the preceding decennium. One of these changes is that the incidence of death is not the same as formerly as regards age. It is lighter for the young, heavier for adults. How is this to be accounted for? That the condition of the young should be improved is only what might be anticipated. Sanitation has been especially directed against the noxious influences to which early age is beyond others sensitive. Children have accordingly profited; but of the numbers saved from early death many were only strong enough just to enter the adult ranks and then die, depressing the average vitality of the latter stages of life and augmenting the adult death-rate. The contrast between the recent death-rates of these two classes would have been more marked but for the interference of two counterbalancing causes. First, the sanitary measures which have saved so many children have also acted upon their elders; for fevers and other preventable diseases are by no means exclusively confined to the young. Secondly, it must be remembered that out of the infants rescued from early death by sanitation, many are naturally sound; others are saved from physical deterioration, and instead of growing up into weakly, perishable adolescents, augment the class of healthy adults. It is, however, doubtful whether these counterbalancing influences have gone very far in lessening the contrast between the death-rates of young and old, and it would seem possible that the mean vitality of the adult classes may really have been diminished.

Another explanation of the comparatively advanced mortality of adult age is that the excitement from the wear and tear of the struggle for existence tells less upon the early years of life than afterwards. Competition begins only when the years of childhood are passed. The expenditure of energy, and loss of leisure and repose, chiefly affect adults, and impose upon them the penalty of exhausted vitality. In the same way the propensity of the population to concentration, which is always attended by a higher mortality, tends to raise the rate of adult deaths; while the migration from the country districts unquestionably thins them of their most vigorous members, and accounts for the fact that the rural adult death-rate has risen in the same way as that of the towns.

Coming now to inquire how the mortality from special causes since the previous decennium has been lowered by sanitation, it appears that while in 1861-70 there were on an average 22,416 deaths annually to a million of persons living, in 1871-80 the proportion of deaths was only 21,282, a saving of 1,144 lives annually to each million, the gross yearly saving to England and Wales being about 30,000 lives.

The mortality from zymotic diseases in the aggregate fell considerably. Putting aside the effect of vaccination upon smallpox—enteric fever (to which most of the deaths registered as fever are owing, and which might with advantage be called "Filth Fever") is of all other diseases that which is most largely and directly affected by sanitary measures. A decline under this head becomes, therefore, the best test available of the efficacy of sanitary administration. The decline in mortality from fever, as a cause of death, has been no less than 45 per cent, the last ten years contributing to the register only 484 entries, as against 885 per million persons in the preceding ten years. And from an examination of a number of consecutive annual reports it becomes clear that the irregular fluctuations of mortality, from the occurrence of epidemical years, are almost entirely obliterated by the continuous and progressive fall which has been produced by more careful sewerage, better water supply, and other sanitary improvements.

Small-pox has been an exception to the general decline. Notwithstanding the notorious fact that this disease is much less prevalent and destructive than it was formerly, an increase of 73 deaths per million is announced as the annual outcome of the last ten years' registration, a rise principally due to the very serious epidemic which marked the years 1871 and 1872. This, though a calamity, was the source of public good. It led to the appointment of vaccination officers, and to a more stringent enforcement of infant vaccination. There has since 1872 been a gradual and notable decline in the mortality from small-pox, especially in children under five years of age. But coincidentally with the fall in the mortality among infants, the loss by death among adults has been greater, the rise of mortality increasing with the advance of age. This circumstance, which is without parallel among other zymotic maladies, may be explained partly by defective vaccination and partly by the neglect of revaccination. But it is mainly to be ascribed to the difference between cow-pox and small-pox as regards their protective action. Vaccination confers only a temporary immunity from small-pox, while one attack of true small-pox generally exempts its subject from any second appearance of the disease. Children were formerly unprotected, and thus mortality from small-pox was excessive. But those who survived an attack had an almost complete freedom in after-life from any occurrence of the disease, and the death-rate of small-pox for adults was very low. The temporary security given by vaccination, unless periodically renewed, involves an augmenting liability to small-pox as life advances; and, as the precaution of revaccination is too generally neglected, the protective influence of cow-pox diminishes in proportion to the remoteness of the operation, and the death-rate of small-pox in advanced life has risen accordingly. We thus derive from the records of the last ten years cumulative proof of the value of vaccination as a sanitary precaution. The high death-rate among unprotected children under two years of age, compared with the comparative security when the rate was steadily going down under a system of enforced vaccination by qualified operators, and rising for those of later years in proportion as their protection by early vaccination was dying out, are facts which no opponent of vaccination can deny.

Now that the nature and conditions of Asiatic cholera have been investigated by scientific observers, and the necessary instructions based upon their discoveries and deductions have been given to the public, it is almost as easy to escape an attack of cholera as to avoid being run over in the streets. And the people have not been slow in learning this lesson; for now when cholera rumours begin to be abroad, instead of resting apathetic or dismayed, we see them, schooled by experience, seconding the timely sanitary operations of the authorities, and watching the development of the disease in other countries less enlightened, as calmly as when in a storm they are under the protection of the lightning rods. The consequence of such sagacious researches and such acceptance of guidance is an immense saving of distressing anxiety, human lives, regrets, and social perplexities.

So, too, the experience acquired during the temporary working of the Contagious Diseases Acts proved the facility of controlling the extension of an easily communicable disease when medical tact was authorised to work in accordance with scientific suggestion; and the unwise suspension of that control has offered calculable demonstration of how vigorously the forces of vice and contagion, when freed from restraint, rebound and spread broadcast the seeds of present and future evil.

Such are a few of the ways in which preventive medicine has bestowed its benefits upon the people, and aided the diminution of disease and mortality.

Curative or practical medicine has no less admirably served humanity. Experimental research has led to therapeutical results of great importance. The true action of digitalis on the heart has been learned, and its use revolutionised. Many new and useful remedies have been introduced, and some knowledge of the properties of strychnine, caffeine, cocaine, chloral, nitro-glycerine, antipyrin, salicylic acid and its salts, nitrite of amyl, eucalyptus, iodoform and other antiseptics, has been gained with sufficient accuracy to add to the power of the physician in the treatment of disease by drugs. But there can be scarcely a doubt that the future progress of medicine must be less in the direction of attempting to cure disease, or to alleviate its symptoms, by drugs—and more in the experimental study of the causes of disease, and of the means by which zymotic diseases may be abolished.

It would be very easy, if more time could be devoted to the subject, to bring before you an array of many more facts redounding to the honour of sanitary enterprise, proving that the recent improvement in the national health is due to sanitary work, and to have supported the statements by statistical evidence; but I must hasten on to consider very briefly the second question: How and by what means can these sanitary results be improved?

2. We can expect very little from legislation—corrective or initiative—until our legislators are instructed and assisted by experts. And it is certain that good laws can only be applied, and their effects obtained, by well-qualified agents acting under one responsible head, such as a minister of public health.

In the House of Commons, Cameron, Farquharson, Foster, Lubbock, Playfair, Roscoe, and Stokes do all that seven men can do for medicine and science with 650 politicians. And some entertain a faint hope that the health of the army and navy will not suffer because the War Office fails to satisfy the just claims of the medical officers, and to attract our best men, at least for a few years, into the services. Others, equally sanguine, imagine that the Public Health Act of 1875 has been so amended by the Infectious Diseases Prevention Act of this year that municipalities and corporations will not be driven to obtain additional sanitary powers by local Acts. There are able men on both sides of the House who think there is some probability of a Bill providing for the better Housing of the Working Classes being so effectually enforced by local authorities with additional powers, that good results must follow. Amendments in the Lunacy Acts, in the Factory and Mining Acts Administration Bills, with further restrictions on the sale of poisons and dangerous patent medicines; a Bill for the Regulation of Midwives, another for the Care of Inebriates, and one Amending the Burial Acts, especially forbidding burial without medical certificate of the cause of death, are all measures which any Government anxious to improve the health of the people may be expected to promote or carry. The Prevention Act of this year, to which I alluded, will very soon lead to official inspection of dairies and a better milk supply; to the cleansing and disinfection of premises, public conveyances, infected rubbish, and some safeguard from the bodies of those who have died of any infective disease. All this will impose new and responsible duties upon the medical officers of health. The difficulty will be to secure a just reward in pay and distinctions for such services. Men may be able to work philanthropically for their fellows, but they must themselves exist, and it is in no niggard spirit that the public must meet the expectations of such officers.

I have already said that a large proportion of the medical officers of health of the future will be qualified medical men, general practitioners; and their protective will be combined with their curative duties. But there must be a class of sanitary consultants, trained by special education, whose work should comprise not only sanitary action, but sanitary instruction, educating and training the people in sanitary progress—correcting national bad habits, especially in the habit of intemperance—and organising and utilising women's work among the people. In London the National Health Society, by its lectures and examinations and tracts has already done much good, and the example should be widely followed. Here the "Manchester and Salford Sanitary Association" and its affiliated societies, especially the ladies' branch, have done much useful work and have published valuable reports. I could not do better than refer anyone anxious to learn how the public health may be improved, to those reports. Such voluntary efforts would be far more successful if they formed part of one general system of instruction in sanitary matters.

But while we are waiting for legislation and the effect of the spread of knowledge among the people, much good may be done in improving the sanitary condition of the people by properly using our present powers without delay.

The conditions of sanitary work are comparatively novel, and require a course of educational activity deviating from the routine of other times and adequate to the development of the qualities indispensable. The same division of labour in medicine as in the other sciences, that is, one class of persons to discover new truths and another to apply them, is an arrangement forced upon us by the changed conditions of modern life. That the means as well as the men will be forthcoming is evident from what has been done. In all directions we find admission of the necessity and in many places provision for meeting it. I see in the prospectus of the medical department of this College it is announced that "exceptional opportunities are offered for the training of students in those branches of science which are of special importance to medical practitioners," and that "there are also special facilities for original research." This is as it should be, and with what is prepared or in peparation in other institutions will in the end accomplish our purpose.

The two Royal Colleges of Physicians and Surgeons in their new building on the Thames Embankment, the College of Surgeons in newly erected rooms in Lincoln's Inn Fields, the Association for the Advancement of Medicine by Research, and our older Universities, are all honourably striving to encourage original workers; and the grants judiciously made by a committee of the British Medical Association have already been of real benefit to mankind, and have assisted in the prevention or eradication of some of the diseases which infest society.

But so far from being assisted by Government or Parliament, we are met by hindrances loudly calling for removal. The first efforts of minister and officers must be to get their hands free. There are Acts of Parliament which are a scandal to civilised society, and an insult to the followers of science. They weigh as an incubus upon scientific pursuits, and must be lifted. Research must be disincumbered of its limitations, and justice must be done to the honourable intentions, the benevolent motives, and the unextinguished humanity with which investigations are directed.

If it were not that their mischievous activity, so full of falsehood and inconsistency, has so perverted the Parliamentary mind, and worked upon the passions of the credulous and ignorant, one would pass by the clique calling themselves anti-vivisectionists with contempt, and leave aside the whole subject of experimentation as one long settled in every sound mind. But standing, as it does, mystified maliciously, their words and actions call for a word of exposure, rebuke, and censure on every open occasion.

The very word vivisection is one which must either be relegated or made to find its true level by an indiscriminate application to all similar actions, whether scientific, sportive, gastronomical, or accidental. They who call it vivisection when a mouse is injected with aconite, must use the same expression when they mutilate or spur the horse, when they follow the hounds after a carted buck, or set the fangs of a greyhound into the overmatched hare. It does not sound well to call it vivisection when they detach and pepper an oyster, or when gourmandism leads to the production of a torturing disease in the goose, but it is no less correct. And if it comes to a question of motives, we may assuredly place a scientific investigator, who inoculates a healthy animal with a poisonous microbe, or who puts a rabid dog into the lethal chamber to obtain his brain for the cultivation of a protective fluid, on the same level with the judge who, to preserve and purify society, orders a man, upon the verdict of his fellows, to be hanged by the neck till he is dead. Have lawgivers, judges, juries, or even their ministers of justice, ever been stigmatised as vivisectionists when carrying out a repulsive duty in the interests of society?

Vivisectionists we all are in the broad sense of the word. The necessity has often to be regretted. Sometimes perhaps we should hold our hand if we reflected a little more. But it is at any rate better to be intentionally, purposely vivisectionists—fanatically speaking—than blindly, ignorantly homicidal. When research is not done for them, men will experiment upon each other, generally in a wholesale disastrous manner. They call it learning by experience, and society pays dearly for it. Experimentation is experience condensed, and the cost in pain and life comparatively insignificant. In the end, when the balance is struck between demonstration and experience, between scientific and popular experiment, men will make their choice between certainty and chance, security and risk.

The work of Pasteur, most of which comes within the last twenty years, in determining the bacterial origin of many diseases, in attenuating the virus, and in proving the mitigating and protective effect of inoculating with it, has led us a certain way in the direction of protection; but protection is not prevention, and it is prevention that must be the object of future efforts. Who shall say that it is impossible? We have no plague now in England, nor have we any longer need of leper houses. The disease from ergotted rye, which at one time often ravaged some of our country populations, is no more heard of. Bacterial organisms, like all others, must have living, feeding, and breeding places. Take away their means of existence, and they will die out, as have done the mammoth and the dodo. If vaccination were universal, and there were no more unprotected subjects in which to settle, what would become of small-pox microbes, starved and turned out of house and home?

Just now a disease as fatal as many of the most prevalent of zymotic diseases put together is either to be added to the number, or classed with them as the result of the action of a living organism, and therefore to be guarded against by attenuated inoculation, or treated by germicidal remedies. We have not yet advanced far in this direction; but I feel very confident that before many years have passed someone who follows me in opening your medical session will be able to speak of pulmonary consumption as one of our vanquished enemies, as another proof of the triumph of experimental physiology and of comparative pathology over a disease which is still fearfully destructive of human life, and the cause of untold suffering and misery. I need not remind you of the work begun in this direction by one of your own lecturers, Dr. Arthur Ransome. But I feel certain that it will receive honourable mention from anyone who hereafter may write the medical history of the Victorian age. And so I trust will the researches brought before the British Association last month by Mr. Hankin on the means of assisting the organism to protect itself from microbes by means of ferments. The injection of ferments, or of "defensive proteids," as a protection against pathogenic microbes, is one of the most promising paths for original research.

One of the greatest practical physicians of our own time, Watson, author of the classical lectures on the "Principles and Practice of Physic," towards the close of his long and honourable life, wrote three essays on the Abolition of Zymotic Disease, on Hydrophobia and Rabies, and on Small-pox and Compulsory Vaccination. These essays were published in one small volume not long before his death, and in his preface he says of them that "of all the efforts of a long professional life, they constitute his best contribution to the sanitary welfare of his fellow countrymen." "Abolish zymotic disease" is the task I would set before you, teachers and students of Owens College, professors and graduates of the Victoria University. Instruct your Mayor and Corporation, your clergy of all denomiations, your own household, that no case of typhoid fever, of scarlatina, of diphtheria, of small-pox, measles, whooping-cough, can be looked upon as natural, providential, or unavoidable; but that the existence of such a group of preventable diseases is a proof of ignorance or negligence and therefore a disgrace to the country, to the town, to the family. And when men learn how much easier it is to prevent than to cure—that none of these diseases are spontaneously generated—we shall have gone a long way towards their total abolition, and they will be banished from our country.

Before I leave this subject, I must say a word against our modern mode of disposal of the dead. If all dead bodies (even those dead from zymotic diseases) are to be buried in the earth, in crowded graveyards or cemeteries, it must be quite hopeless to attempt to stamp out infective diseases. I have shown elsewhere (and the facts are accessible to anybody) that the germs of these diseases are preserved in the earth far below the surface, and are brought up full of deadly power by earthworms; and that when the ground is disturbed after many years, the germs are in full and fatal activity. Burial reform is needed not only as a means of general sanitary improvement, but especially as a mode of destroying the germs of zymotic diseases. And although some good may be done by better supervision of cemeteries, and stricter enforcement of the provisions of the Burial Acts, nothing short of a really radical reform, and the substitution of cremation and burial of the ashes only, for burial of the entire putrefying body, can afford real security.

In a memorial presented by the Church of England Burial Reform Association to the Home Secretary, the following statement was made :—" In the Ardwick Cemetery, Manchester, in ten years (1877-86) the number of interments was 17,148 in an area said to exceed 6¼ acres, but which on the Ordnance Map appears not to exceed 4½ acres. . . . The only drainage of the place being what is known as natural drainage, the surrounding dense population is exposed to great danger. This small burial ground has been in use since 1836, and it is calculated that nearly 70,000 bodies have been interred in it."

Such a shocking condition of our burying places is not confined to Manchester, and is already arousing our leaders to a sense of its importance. Only last July the Prince of Wales expressed in writing his trust that " in view of the rapidly increasing population of the kingdom, the present system of burying the dead may be exchanged for one more in accordance with the requirements of the age and the sanitary interests of the community." The Cremation Society of England has already done a great deal towards initiating a revival of the ancient custom. You have a Cremation Society and a Company in Manchester, but hitherto they have done nothing to lessen the horrors of your overcrowded cemeteries. At the Woking Crematorium 138 bodies have already been cremated, and last Saturday it was visited by the President and some 80 members of the Association of Public Sanitary Inspectors. They and Captain James, Chairman of the Sanitary Committee of the London County Council, were very favourably impressed, and you have the advantage of our experience. From what I have seen of the designs prepared here, I may say that, in my opinion (in the words used in the prospectus of the Company), "the Manchester crematorium will far exceed in perfection of detail any yet erected." Let us hope it may soon be completed and in active operation. It may be said of your council as the *Times* said last week, that "public authorities, almost without exception, appear to have attained to a sound practical recognition of the duties which the progress of knowledge has imposed upon them. Coupled with these conditions, an immense amelioration of the lives of multitudes of Londoners has been effected by the weekly half-holiday, by the increased facilities of access to the country or to the suburbs, by the multiplication of open spaces, by the provision of plots of ground devoted to cricket and other games, and in contrast to what we have said about too many of the French, by the excellent food of which our working classes are accustomed plentifully to partake." I trust you will impress upon your Council that, in addition to all this, even with an abundant supply of pure water, with an abatement of the smoke nuisance, better ventilation, and unadulterated food—so long as the custom of burial of the bodies in the earth of those who die from infectious diseases prevails—it will be impossible to stamp out these diseases, and the death-rate will remain far too high, even if some frightful pestilence is not needed to enforce obedience to sanitary truths. If our children are swept away by some plague or fever, can we plead that we have not been forewarned, or that the punishment is undeserved?

There are many other subjects connected with National Health on which I should like to say something; but time flies, and I must employ what is left by saying a few words specially to the younger men who are listening to me.

It is well known that Abernethy, before one of his introductory lectures to medical students, looked around and said in a melancholy aside, "What is to become of you all?" I have no such fear for you. We all know that there are no great prizes in medicine as in the Church or the Law—no archbishops nor bishops, no deaneries, no Lord Chancellor, no lords justices, no judges, no such peerages or pensions as reward the soldier or the sailor, no such distinctions as are gained by political service. But I know of no other vocation where any man of sound health, average ability, industry, good character, and a desire to be useful, is so certain to obtain all the necessaries and comforts, and some of the enjoyments of life for himself and his family, and to deserve the respect and gratitude of his fellow-men, as in the profession of Medicine. Sir John Lubbock says in his delightful little book, *The Pleasures of Life:* "On the whole I believe there never was a time when modest merit and patient industry were more sure of reward." Some able men may fail, and some incompetent men may succeed, with us as in all other parts of life, but these are the rare exceptions which prove the rule. Many years ago I spent a week in a country house with one of the most successful men of his time—Wilberforce, then Bishop of Oxford. He told me that he once talked over this matter with some very able men, among others Tait, then Archbishop of Canterbury, and Cockburn, then or afterwards Lord Chief Justice. Why did some men succeed and others equally able fail in life? Many reasons were given, but Tait said, 'You are all wrong. You have missed the real secret: It is sympathy.' And 'Tait was right,' said Wilberforce, 'and we all agreed with him.' And, so, I think, will you. We must feel for others, feel with them, if as well as being useful to them we obtain their confidence and support. Many of you have read *Middlemarch*, and may remember the country doctor, Lydgate, in that wonderful novel. He succeeded, not because of his "conviction that the medical profession as it might be was the finest in the world, presenting the most perfect interchange between science and art, offering the most direct alliance between intellectual conquest and the social good," but because "he cared not only for 'cases,' but for John and Elizabeth, especially Elizabeth." It was by no means uncommon to hear patients speak of one of the most successful physicians of our time in this way: "I don't think he is so very clever; indeed, I think he must be overrated; but he exactly understands my case. He takes a great interest in me." Some people thought this was only clever acting, almost dishonest. I disagree with them entirely. I believe it was simple genuine good nature—kindly feeling, a desire to be useful, a pleasure in doing good, such as most men feel and all may cultivate. Pray do this, all of you. You are not playing with chess-men nor a *Kriegspiel.* You are influencing for good or for evil your own fellow-men, the men who make the nation, the men whose wounds you may heal, whose sufferings you may shorten, whose life you may prolong. And who can tell where the influence for good of any one of you may reach? You drop a pebble into a smooth lake, and it disappears; but from that centre widening circles radiate, and, gently stirring the waterplants on the surface, and the grass along the banks, give them renewed life and motion. So may all true work—at first, perhaps, thrown away, lost, or forgotten, or begun under difficulty—be continued with increasing effect and in wider circles, and the good not ended when the workman's own course is finished, and his efforts to make men healthier, happier, and better, have earned for him the esteem of his fellow-workmen. Then he may be able, after years of anxious toil, whether he has achieved or only deserved success, to say with truth, "I have fought the good fight."

Thirteen years ago I spoke hopefully of the future, Those hopes have been more than justified. I spoke of the education of the men who were to practise medicine. I said we must so order our schemes of education that our students should have the advantage of the highest culture to be obtained by an English gentleman. I could then only speak of the essentials of a chartered University as already existing in Manchester. Now the Victoria University has obtained its charter, and it must not fail in the race with Oxford, Cambridge, London, or any other University. They are strong competitors, but there is nothing so good for a man or an institution as the competition of strong worthy rivals. You will not beat them easily, but it will do you good to try. And to all associated with the Victoria University or Owens College let me say, in conclusion, that a review of your past augurs well for the future. The new session is opening with increasing numbers under happy auspices. "The little that has been done seems nothing when we look forward and see how much we have yet to do."[1] Learn and try to do it well. "Not failure, but low aim, is crime."[1] And believe me that upon your work, your knowledge, and your sympathy will largely depend your own happiness and that of all within your influence. Act in George Herbert's spirit: "Acquit thee bravely, play the man"—should we not say the gentleman? for "he is gentle who does gentle deeds,"[2] and so acting be sure that—

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[1] Goethe.

If thou do ill, the joy fades, not the pains;
If well, the pain doth fade, the joy remains.[3]

[1] Lowell. [2] Chaucer. [3] Herbert.

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